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may frequently find recently hatched embryos, around the affixed pole of the yolk-sack of which shreds of the ruptured egg-membrane still adhere; during the later stages such shreds are not usually visible. There is a decidedly heterocercal tail developed from a special tail-fold, since there is no absolutely continuous median fin-fold developed, as in many other forms.

Oviposition occurs about the middle of July, in the latitude of Wood's Holl. How long it lasts has not been determined, but judging from the condition of the roes and milt of the adults at that time, it seems very probable that they do not spawn later.—*John A. Ryder.*

PHYSIOLOGY.¹

CONDITIONS WHICH DETERMINE COAGULATION OF THE BLOOD.—Herr Holzmann adds something to our knowledge of the conditions of blood-clotting. His results are summed up as follows: 1. A body called fibrinogen, belonging to the class of globulins, can be obtained from horse's blood, and solutions of fibrinogen neither coagulate spontaneously at ordinary temperatures nor upon dilution with water. 2. Defibrinated blood, blood serum, watery extract of the albuminous coagulum formed in blood serum by the addition of alcohol, or the extract obtained from egg-albumin coagulated in the same way, the putrescent fluids obtained from cooked egg-albumin, and long-continued passage of oxygen, all cause typical coagulation of the solution of fibrinogen at ordinary temperatures, with the production of fibrin. 3. Fibrin-ferment is not peculiar to the blood, but occurs among the decomposition products of albumin. 4. It is probable that fibrin is the product of the oxidation of fibrinogen. 5. When a dog is rapidly bled to death (one and a half to three hours), the last portions of blood drawn clot quicker than the first, though the amount of fibrin formed does not markedly vary. 6. Venous blood clots more slowly than arterial blood; suffocation delays coagulation. Curare, chloralhydrate, chloroform, quinine and soda carbonate, also delay the coagulation.

SPECIAL PHYSIOLOGY OF THE EMBRYO.²—The last of the four separately issued parts of this work having now appeared, it becomes possible to speak of it as a whole. It may be said that the author has done for the physiology of the embryo what Balfour did for the morphology in his *Hand-book*. Some of the researches described here are closely connected with those on new-born children described in the author's previous work, *Die Seele des Kindes*, to which he has frequently occasion to make reference. His most important general results are that mobility appears long before sensibility, and that the sense-organs and the parts of the

¹ This department is edited by Professor HENRY SEWALL, of Ann Arbor, Michigan.

² By Professor W. Preyer, Leipzig, 1885. pp. XII. 644.

nervous system connected with them are capable of functioning before it is at all likely that in normal embryonic life they have any proper functions to perform. By "mobility" is to be understood more especially the power of making spontaneous or "impulsive" movements. The presence of sensibility can only be proved by the existence of what is really a kind of mobility—that is, reflex mobility. When the appropriate reflex movements are obtained on stimulating the sense-organs it is inferred that the corresponding kind of sensibility is present. Reflex movements are not only later in appearing, but can also be made to disappear more easily than impulsive movements. The movements that indicate sensibility can be suppressed (in the artificially extracted embryo of the rabbit) by applying chloroform to the skin; with more difficulty by causing chloroform to be breathed. In either case the anæsthesia passes off very rapidly. It is supposed that the chloroform in the first case acts directly, in the second case, indirectly, on the nerves of the skin; that it only secondarily affects the spinal cord, and that it does not act at all on the brain. The movement of sensibility in the embryo gradually rises from its first appearance up to birth. In the embryo of the rabbit, the skin being irritated, two seconds may pass from the contact to the reaction. The occurrence of respiratory movements is dependent on the power already present of reflex movement in response to stimuli on the skin, not the power of reflex movements on respiration. Little has been ascertained with regard to the sense of temperature and the muscular sense; the fact that mobility is increased by warmth, diminished by cold, of course proves nothing as to the sense of temperature properly so-called. The human foetus gives signs of having feelings of taste two months before birth. The whole complex of parts belonging to the ear is functionless before birth, as are also the parts of the eye; but the power of raising the eyelid is present; the eyes are not closed in the human embryo after the sixth month. The conditions for the organic feelings are present several weeks before birth; pleasure and pain can be distinguished. The author finally puts the question, What is the actual state of the embryo normally? He arrives by a series of arguments that seem pretty conclusive when taken together, at the result, that its state is normally like dreamless sleep or like the state of a hibernating mammal; it does not wake up from this state before birth except momentarily, and then only when strongly stimulated.—*Mind*, No. xxxvii, pp. 152.

ARE THE MUSCLES DEAD OR ALIVE DURING CADAVERIC RIGIDITY?—Professor Brown-Sequard has demonstrated that for several weeks after death, or as long as *rigor mortis* persists, the muscles of an animal undergo slow alternate contractions and elongations. The movements were only perceptible when one or the other set of a group of antagonistic muscles was divided, and they ceased totally when cadaveric rigidity finally passed away.

The movements were determined by measuring the angles through which a limb was turned, and also by obtaining on a rotating cylinder a graphic tracing representing the rate and extent of the muscular change. A dog was killed on October 6th, and on the 15th one hind limb was fastened in extension and the angular movements of the foot observed; on the 15th, the angle formed by foot and leg was 34° ; on the 16th, 32° ; the 17th, 16° ; the 22d, 12° ; the 25th, 21° ; the 28th, 23° ; the 30th, 18° ; the 31st, 20° ; November 4th, 23° . The rigidity still persisted on November 8th when the observations were described.

These movements are absolutely independent of external conditions, temperature, moisture, etc. In fact, in the same animal, while some of the rigid muscles are elongating, others are contracting and still others are at rest. Professor Brown-Sequard comes to the startling conclusion that these movements prove that the muscles in *rigor mortis* are not dead, but are still endowed with vital powers, but, however, are in a certain chemical condition which is antecedent and preparatory to final death.—*Comptes Rendus, T. ci, p. 926*.

GLANDULAR AND VASO-MOTOR FIBERS OF THE CHORDA TYMPANI AND GLOSSOPHARYNGEAL NERVES.—Professor Vulpian has renewed after a new method his researches on this important and difficult subject. Curarised dogs were operated on in such a way that the cranial nerves could be stimulated by an induction current at their points of origin within the skull. The nerves were usually laid intact upon the electrodes; reflex effects failed, probably because the appropriate nerve centers were injured in the operation. M. Vulpian concludes that both the glandular and the vaso-dilator fibers of the *chorda tympani* leave the medulla with the facial but none of them come from the trigeminal nerve. It is certain, apparently, that the *chorda tympani*, besides its glandular and vaso-dilator filaments, supplies to a large extent the anterior two-thirds of the tongue with sensory nerves of taste.

Stimulation of the facial nerve at its origin causes an abundant flow of saliva from the sub-maxillary gland on the same side, but none from the parotid gland, and intense congestion of the anterior two-thirds of the corresponding side of the tongue. Stimulation of the glossopharyngeal nerve at its foramen of exit from the skull causes congestion in the posterior third of the tongue on the same side and secretion from the corresponding parotid gland. When the trigeminal nerve is excited in the same way, no secretion is obtained, nor is there any vaso-motor change in the mucous membrane of the tongue.

The geniculate ganglion is a trophic center for the *chorda tympani*, for, after intra-cranial section of the facial nerve, the fibers of the *chorda* contained in the latter remain intact while all the others degenerate.

Though not bearing directly on the present subject, it is important to observe that Vulpian has succeeded in separately stimulating near their origin both the spinal accessory and the pneumogastric nerves. Excitement of the first named alone causes arrest of the heart, while both are able to set up movements in the stomach and other organs. Stimulation of the pneumogastric seemed to have no influence upon the circulation or the secretion of the mucous membrane of the stomach.—*Comptes Rendus, T. ci, p. 851.*

PSYCHOLOGY.

THE MATERIAL CONDITIONS OF MEMORY.—The greatest possible importance attaches to the question of the physical conditions of consciousness, but the investigation of it is surrounded with great difficulties. One of the most available points of approach is by a study of the characteristics of memory. Memory may be defined as *intermittent or recurrent consciousness*; and it follows that whatever produces or destroys memory is also a cause of the appearance or disappearance of consciousness. I refer especially to reminiscence, or the recurrent consciousness of a previous impression, as that part of memory which gives it its importance in this connection.

Memory is reasonably understood to be the result of an impression made on a physical basis of consciousness by some stimulus. The structure of this matter is affected, so that on the recurrence of consciousness within it, the consciousness takes the form or character of the modified structure it finds there. Important information as to the effects of different stimuli may therefore be gained by a consideration of their relative capacities for reproduction in the reminiscence phase of memory. On this point the following propositions may be considered:

There are two sources of impressions which reappear as memories; those from the subject or subjective activities of the mind, and those from objects or things external to the mind. Before considering these, it is necessary to guard against confounding the recollection of the occurrence of an event, with the recollection or reminiscence of the sensations which constituted that event. Thus one can remember that he reached some conclusion in a given discussion, but may be unable to remember the conclusion itself. He may remember that he was angry, but be quite unable to reproduce the passion. He may remember that he had a toothache, but may be unable to reproduce the suffering itself.

Subjective stimuli are of the two classes into which all mental acts fall, the intelligent and the emotional. Objective stimuli belong to the pains and pleasures of all parts of the body, and to the special and general senses. To what extent are all these phases of consciousness susceptible of reproduction in the reminiscence part of memory? There is a kind of memory not strictly reminiscence, which may be well termed, *recognition*. The difference